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Fatal N-butyl-2-cyanoacrylate pulmonary embolism after sclerotherapy for variceal bleeding
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A 30-year-old man presented with hematemesis. Five years earlier, he had been diagnosed with *Escherichia coli* liver abscesses, without a clear underlying cause being identified. Although he recovered with antibiotic treatment, extensive thrombosis of the portal, splenic, and superior mesenteric veins remained. The patient received prophylactic propranolol for a large fundic varix, and oral anticoagulants during the first year as well. Endoscopic evaluation during the current admission revealed bleeding from the fundic varix, and an injection of 1 ml N-butyl-2-cyanoacrylate (enbucrilate, Histoacryl), 0.5/0.8 (v/v) diluted with Lipiodol, was administered. Although the hemorrhage was temporarily stopped, repeated cyanoacrylate injections (two injections of 1 ml) and subsequent placement of a Sengstaken-Blakemore tube had to be carried out due to recurrent severe bleeding.

The same day, a partial gastrectomy, splenectomy, and esophageal transection were performed. Postoperative chest radiography (Figure 1, left) and computed tomography (Figure 1, top right) revealed multiple cyanoacrylate pulmonary emboli. Mechanical ventilation had to be started. Abdominal sepsis from a subphrenic abscess, with multiple organ failure, subsequently occurred. Intravenous heparin therapy was started due to deep vein thrombosis in both legs. The patient showed further pulmonary deterioration (Figure 1, bottom right). Thirty-seven days after the initial sclerotherapy, he died of abdominal sepsis and deteriorating pulmonary function. No recurrent bleeding had occurred since the surgical procedure.

Although cyanoacrylate is generally regarded as the first-line treatment for bleeding gastric varices [1], complications may occur, such as the needle adhering to the varix, pyrexia, deep ulceration due to accidental paravariceal injection, and in particular pulmonary embolism [2,3]. Risk factors for pulmonary embolism are: more than 1 ml cyanoacrylate-Lipiodol per injection, excess Lipiodol (cyanoacry-

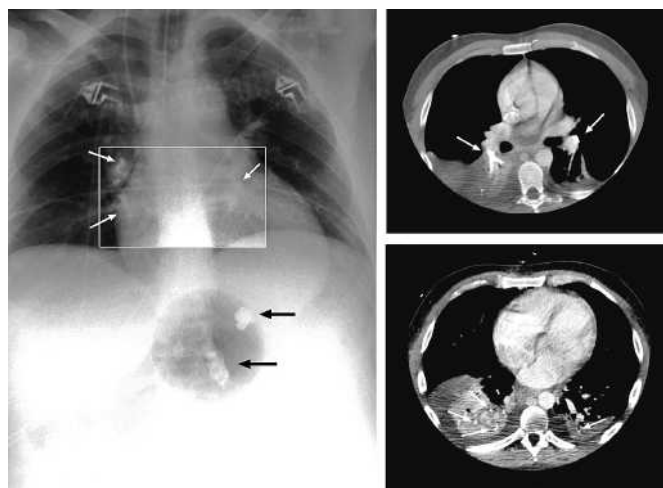


Figure 1 **Left:** A chest radiograph showing multiple pulmonary emboli (white arrows) and two large fragments of Cyanoacrylate in the upper abdomen (black arrows). **Top right:** Postoperative computed tomogram, showing multiple cyanoacrylate pulmonary emboli on both sides (arrows), with an increased signal intensity in the segmental and subsegmental pulmonary arteries. **Bottom right:** Computed tomograph approximately 2 weeks after the onset of the pulmonary emboli, showing pulmonary infarction, formation of bullae, extensive consolidation, pleural effusions, and residual enbucrilate (arrows).

late/lipiodol ratio below 5:8 v/v), injection of excess distilled water with the needle still located in the varix [4], and slow injection, especially in case of varices with a high flow rate and a large diameter [5]. Surgery is still a valuable treatment alternative, especially in cases of left-sided portal hypertension.

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